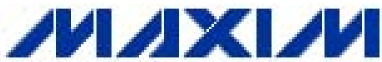

RELIABILITY REPORT

FOR

MAX14566AEETA+T

PLASTIC ENCAPSULATED DEVICES

November 10, 2010

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Richard Aburano
Quality Assurance
Manager, Reliability Operations

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Conclusion

The MAX14566AEETA+T successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards.

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I. Device Description

A. General

The MAX14566E/MAX14566AE/MAX14566BE are second-generation USB devices that combine Hi-Speed USB analog switches with a USB host charger (dedicated charger) identification circuit. These devices support both the latest USB Battery Charging Specification Revision 1.1 including data contact detection and a set resistor bias for Apple-compliant devices as well as legacy USB D+/D-short detection using data line pullup. The MAX14566E has a p-MOSFET open-drain control output (CEN) and the MAX14566AE has an n-MOSFET open-drain control output (CEN) to restart the peripheral connected to the USB host.

These devices feature high-performance USB Hi-Speed switches with low 4pF (typ) on-capacitance and low 4.0W (typ) on-resistance. In addition, the MAX14566E/ MAX14566AE feature a single digital input (CB) to switch between pass-through mode and autodetection charger mode. The USB host charger identification circuit allows a host USB port to support USB chargers with shorted DP/DM detection and to provide support for Apple-compliant devices using a resistor bias on USB data lines. When an Apple-compliant device is attached to the port in autodetection charger mode, the MAX14566E/ MAX14566AE/ MAX14566AE supply the voltage to the DP and DM lines from the internal resistor-divider. If a USB rev 1.1-compliant device is attached, the devices short DP and DM to allow correct charger detection. The MAX14566BE features additional digital input (CB1) to allow forced charger mode.

These devices have enhanced, high electrostatic discharge (ESD) protection on the DP and DM inputs up to ±15kV Human Body Model (HBM). The MAX14566E/ MAX14566AE/ MAX14566BE are available in an 8-pin (2mm x 2mm) TDFN package and are specified over the -40°C to +85°C extended temperature range.

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II. Manufacturing Information

A. Description/Function:	USB Host Charger Identification Analog Switches
B. Process:	S45
C. Number of Device Transistors:	2132
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	Thailand
F. Date of Initial Production:	August 19, 2010

III. Packaging Information

A. Package Type:	8-pin TDFN 2x2
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-4125
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Ja:	110°C/W
K. Single Layer Theta Jc:	37°C/W
L. Multi Layer Theta Ja:	83.9°C/W
M. Multi Layer Theta Jc:	37°C/W

IV. Die Information

A. Dimensions:	31 X 37 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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V. Quality Assurance Information

A. Quality Assurance Contacts:	Richard Aburano (Manager, Reliability Operations) Bryan Preeshl (Vice President of QA)
B. Outgoing Inspection Level:	0.1% for all electrical parameters guaranteed by the Datasheet. 0.1% For all Visual Defects.
C. Observed Outgoing Defect Rate:	< 50 ppm
D. Sampling Plan:	Mil-Std-105D

VI. Reliability Evaluation

A. Accelerated Life Test

The results of the 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 48 \times 2}$$ (Chi square value for MTTF upper limit)

(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$\lambda = 22.9 \times 10^{-9}$

λ = 22.9 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maxim-ic.com/qa/reliability/monitor. Cumulative monitor data for the S45 Process results in a FIT Rate of 0.49 @ 25C and 8.49 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot TL9YBQ002F, D/C 1025)

The AL07-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 1500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX14566AEETA+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	TL9ZBQ002C, D/C 1025

Note 1: Life Test Data may represent plastic DIP qualification lots.

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